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The Brickbuilder.

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Boston is certainly to be congratulated on its new building law, the most complete and, on the whole, the most satisfactory law governing the building operations of any city in this country. The commission of three members, viz., Mr. J. G. Stearns, architect, Mr. Wm. H. Sayward, builder, and Mr. Minot, representing the real estate interest, who drafted the act, carefully examined the building laws of the most prominent European and American cities, and after revision by Captain Damrell, Boston's veteran inspector of buildings, and the mayor, Hon. Nathan Matthews, Jr., who has himself given great attention to building matters, the act was finally passed without further modification, and the result is not only a great improvement on the old law, but a law which is likely to be taken as a model by other cities. It was to be foreseen that there would be some points which might be improved; but the law as it stands is doubtless as good as it is possible to obtain in the present state of public opinion in the business community with regard to building matters. The great fires and the exertions of architects and underwriters have already done much towards educating that public opinion; but it will probably be some time yet before what are now regarded as the imperative requirements of business are made so far to yield to the demands of fire resisting construction, as to render possible a still further restriction of the heights of buildings and of the permitted open floor area without fire walls, and a restriction of the window area on narrow streets. We should like to have seen the height of buildings in proportion to the width of streets made less than it is by the present act. But it is much to accomplish the great improvement in this respect required by the new law. We hope, however, the time may come when we shall have a restriction more nearly approaching that of the Paris law which carefully proportions the heights of buildings to the width of streets, and limits the maximum height to twenty meters (65.60 feet) to the top of the cornice. This restriction has the further artistic advantage of giving something like uniformity to the sky line of streets which, with our method of building in slices, is greatly to be desired. The people of Boston may, at any rate, congratulate themselves that there will not be any more Ames buildings. It would have been well, also, could the permitted area of open floor space without fire walls have been further restricted. The London Metropolitan Building Act furnishes the recognized standard in this respect, which restricts the floor space without fire walls to five thousand superficial feet, while the new building law for the city of Boston restricts the area to ten thousand square feet, and this limitation applies only to buildings of the second class. A restriction of floor space should be required in buildings of the first class also. It is to be regretted, too, that the use of wooden standing finish in buildings of the first class could not have been restricted. The most important changes in the law are the establishment of a Board of Appeal from the inspector, the classification of buildings as first, second, and third class, the restriction of the height of all buildings except church spires to a maximum of one hundred and twenty-five feet to the highest point of the roof, the provision that every building over seventy feet high shall be a first-class building, *i. e.*, a building of fireproof construction throughout (under the old building law the limit was eighty feet), the restriction of the heights of buildings to two and one half times the width of the widest street on which they stand, and the provision that all structural iron work shall be protected by terra-cotta or other noncombustible material. There are many other changes all looking to greater substantiality in building; but the above indicates the general lines on which the act is laid down. The section relating to strength of materials (Sect. 19), not content with the general terms of the old aw, gives tables stating the maximum stresses that will be allowed in different materials for various purposes; and the strength and composition of mortars for the various classes of work are accurately specified. The more stringent requirements with regard to second class buildings are greatly to be commended.

Those portions of the act relating to theatres and public buildings, and to tenement houses are especially full and complete, and every building hereafter erected or enlarged for the accommodation of transient guests, and containing more than fifty rooms above the first floor, must be a thoroughly fireproof building.

It may be of interest to our readers if we note more particularly the provisions relating to brickwork and the use of terra-cotta as a fireproof material. The general provisions are similar to those of the old act, viz., Sect. 33. "All brickwork shall be of merchantable well-shaped bricks, well laid and bedded with well-filled joints in mortar," as elsewhere required, "and well flushed up at every course with mortar. Bricks when laid shall be wet or dry as the inspector may direct." The old law provided that "all brick used during the warm months shall be well wet at the time they are laid, and shall be dry at the time they are laid during the cold months." The stresses in tons of two thousand pounds per square foot allowed in brick work are given as follows: First-class work of hard burned bricks and including piers in which height does not exceed six times the least dimensions, laid in

(*a*) One part cement, two parts sand . . .	15
(*b*) one part cement, one part lime and eight parts sand	12
(*c*) lime mortar	8

Brick piers of hard burned bricks, in which height is from six to twelve times the least dimension:

Mortar "a"	13
Mortar "b"	10
Mortar "c"	7

For "light hard" bricks stresses not to exceed two thirds of the above.

Mortar below level of water is required to be no poorer than one part cement and two parts sand. Mortar for first class buildings

must for one half their height be no poorer than one part cement and two parts sand, and above that be of equal parts cement and lime and the proper proportion of sand. For second-class buildings (*i. e.*, buildings not of the first class, the external and party walls of which are of brick, stone, iron, or other equally substantial or incombustible material) the mortar is required to be no poorer than equal parts of lime and cement with a proper proportion of sand.

Sect. 34. "The inside four inches of any wall may, upon a special permit issued by the inspector, be built of hard burnt hollow clay bricks of quality and dimensions satisfactory to the inspector, and thoroughly tied and bonded into the wall."

With regard to bond the new law follows the old and provides (Sect. 35) "that every eighth course at least of a brick wall shall be a heading or bonding course, except where walls are faced with face brick, in which case every eighth course shall be bonded with Flemish headers, or by cutting the corners of the face brick, and putting in diagonal headers behind the same." It is greatly to be regretted that the new law should not have made an improvement in this matter of brick bond; it should have put its veto on our absurd practice of building a facing so slightly attached to its backing, a practice which makes our methods of brick construction the laughing stock of foreign architects and builders brought up under the influence of more thorough traditions. The thicknesses of walls of different heights are carefully specified as in the old law (Sects. 36, 37.) Following also the old law (Sect. 38) "vaulted walls shall contain, exclusive of withes, the same amount of material as is required for solid walls, and the walls on either side of the air space shall be not less than eight inches thick, and shall be securely tied together with ties not more than two feet apart." (Sect. 39.)" In reckoning the thickness of walls, no allowance shall be made for ashlar unless it is eight inches or more thick, in which case the excess over four inches shall be reckoned as part of the thickness of the wall." It would have been well had the act similarly provided that a facing of face brick should also not be reckoned as part of the thickness of the wall unless properly bonded by at least a course of headers every eighth course. A better bond than this it would probably be useless to expect at the present time; but so much as we here suggest should at least have been required.

Sect. 40. External walls may be built in part of iron and steel, "provided that all constructional parts are wholly protected from heat by brick or terra-cotta, or by plastering three quarters of an inch thick with iron furring and wiring."

Sect. 41. "In first and second class buildings all party and bearing walls above the foundation shall be of brick." "All weight bearing metal (Sect. 51) in first and second class buildings hereafter built shall be protected by brick, terra-cotta, or plastering on metal laths and furring, or other incombustible material approved by the Board of Appeal." Sect. 52. "Upright supports in first and second class buildings hereafter erected or altered, of other material than brick below the first floor shall be protected by a jacket of brick or terra-cotta at least four inches thick, or by a coating of plaster one inch thick on wire or metal lathing or other substantial fireproof material." "All cornices hereafter built (Sect. 51) shall be of brick or other incombustible material." Sect. 63 (of firestops) provides that "every second-class building hereafter built, except as hereinafter provided, shall have a sufficient firestop at each floor, covering the whole floor of each story through all stud partitions, and extending to the masonry wall"—"every such firestop shall consist of a solid, air-tight, cohesive layer, at least one inch thick, of tile, brick, terra-cotta, or other firemade material, plaster, cement, cinder or ashes, or of a combination of the same, or of equally non-inflammable non-heat-conducting materials laid between the upper and under floors, or occupying all the space between the timbers under the under floor."

It will be seen from these provisions the great importance that is attached to brick and terra-cotta,—the clay, firemade substances,—as fire resisting materials, and the great value they have in the best modern construction. Especially noteworthy is the provision requiring walls faced with ashlar to be thicker than if all of brick. It is indeed coming to be recognized more and more that brick is on all accounts the most durable of all building materials, and in this age when fireproof construction is becoming of such importance it is likely to be increasingly used. Does not this suggest the importance of giving to this brick and terra-cotta construction an artistic expression appropriate to itself? Does it not suggest that an adequate following in design of the lead given by our new methods of fireproof construction will lead to a form of art in many respects different from any treatment which brick and terra-cotta have yet received? Indeed, we maintain, that there are already ample signs of the development to which we refer. It is to be hoped that our restless desire for something new, our blind following of the lead of fashion, which tend to arrest any wholesome and gradual development, will not nip this new flower in the bud, as they have already so many others. A consistent brick, terra-cotta, and tile construction, such as that to which our new methods of fireproof building point, differs so widely from previous methods of construction, that it must lead to new artistic forms, if it receives any adequate and harmonious artistic treatment. But this new development cannot be hurried. If it is forced it will be destroyed. A development to be of any value must be gradual and natural. It is our misfortune to live in a self-conscious age which makes natural processes difficult. We are constantly digging up the seed that is in the ground to see how it is getting on. Let us be on our guard against this error, and while striving to make the best use of the wealth of material now at our command, let us be sure and use them in a natural and logical way, and let our treatment of any design be always suggested by the conditions of the problem in hand, and by the constructional system adopted.

There is one provision of the new law which is likely to have more far-reaching consequences than might at first thought appear, and cannot but result ultimately in still further improvement of the building regulations of Boston. We refer to the creation by the new act of a Board of Appeal. Sect. 12 reads, "There shall be in said Boston a board, to be called the Board of Appeal from the Inspector of Buildings, which board shall consist of three members to be appointed as follows: One person, who shall be appointed by the mayor with the approval of the Board of Aldermen, and who shall hold his office for three years from the date of his appointment. One architect, who shall be appointed with the approval of the mayor by the Boston Chapter of the American Society of Architects, such appointment being duly certified by the proper recording officer of said chapter, and who shall hold his office for two years from the date of his appointment. One master builder, who shall be appointed with the approval of the mayor by the Master Builders' Association, such appointment being duly certified by the proper recording officer of such association, and who shall hold his office for one year from the date of his appointment. The terms of the several members of said board shall be three years each after the expiration of the first terms." The rest of the section relates to compensation, removal, absence, etc. Sect. 13 provides that any person to whom permit has been refused or an order issued involving expense may, within fifteen days, appeal from the decision of the inspector to the Board of Appeal. Undoubtedly by "American Society of Architects" the American Institute of Architects is intended, as no national body calling itself "American Society of Architects" exists. It is a pity that this inaccuracy should have

been allowed to creep in. But it will undoubtedly not be permitted to affect the working of the act.

The importance of this Board of Appeal is greater than the mere provisions of the act itself might seem to indicate. Not only will its existence give stability to the inspector's decisions and secure him from any accusations of partiality or want of judgment, and thereby greatly strengthen his hands, but the decisions as they come to be made by the board will give a body of precedents somewhat similar to those of the courts, making the execution of the law consistent and impartial. Further than that the Board of Appeal will inevitably become the recognized custodian of the law, and any recommendation they may make for its modification or improvement will come with a weight of authority hardly to be resisted without good reason. It is hard to conceive of any further changes being made in the law without the recommendation or the sanction of the Board of Appeal. It will have had the experience in watching closely the execution of the law and its effects, and legislators can hardly avoid looking to it to recommend any changes for its improvement, which its actual workings and further constructional development and experience may in future seem to require.

The excellent design for a brick church by Mr. J. A. Van Straaten, Jr., which we publish in this number, and of which a detailed description will be found in another column, we commend to our readers as a striking example of how much can be accomplished with perfectly simple means. Indeed it is its simplicity and restraint which gives this design its greatest value. As stated in the description, and as will be seen by a careful examination of the drawings themselves, in spite of the elaborateness of effect, a single form of moulding, and that a very simple one, is used throughout, except in the cornices, sills, and water tables where there are two or three more patterns. Apart from some of the large starters in the traceried windows, not a half dozen separate brick moulds would be required to build this large church with all its variety of architectural form. The general plan followed has been that of the traditional cruciform church; but the forms here shown could easily be adapted to other plans and simpler requirements. The mass of the building is at once dignified and graceful, and the perspective effect would be most imposing. The design of the tower seems to us especially happy in its simple and massive proportions and its richness of effect with simple and appropriate detail. Pure Gothic throughout, it is also distinctively a brick building, its forms being thoroughly appropriate to the material used. Whether using the traditional cruciform plan, as in this design, or with a simple nave, or with the auditorium plan of some modern churches, there is no doubt that our church architecture would be vastly more satisfactory than it is, if it were content to follow the admirable precedents of the olden times, especially of Gothic times, instead of chasing the Will-o'-the-wisp of originality, which has led our church architecture especially into all sorts of miserable quagmires, and which places eccentricity instead of excellence as its ideal. It would be easy to enrich the design here given by ornamentation in terra-cotta in the cornices, the archivolts, or the caps of the piers; but the simpler forms make the design more easily adaptable to other conditions; and in any case the addition of ornament is not to be recommended unless that ornament can have the highest artistic excellence. Absolute plainness is preferable to elaborate decoration, unless it has in itself real artistic value, and is treated with a delicate feeling of appropriateness to the place it is to occupy.

The receipt from time to time of inquiries regarding the lateness of publication of THE BRICKBUILDER, leads the publishers to again make an explanation, which it is hoped will clear our readers' minds. The paper was undertaken in the fall of last year, but the business was not organized until January of this year. A partial canvass among architects apparently showed a large amount of available material, but when it came to the actual securing of the drawings, many were found impracticable and many needed redrawing to fit them for reproduction by process or lithography. It had been decided to date the first number January, in order to have the volume begin with the year, and as that number was expected to be out in February, the publishers were confident that the lost time could be regained in two or three issues. As a matter of fact, unavoidable delays held the initial number over into March, and the additional time thus lost it has been found difficult to regain without some sacrifice of quality in the material published. While not losing time in the issue of the numbers thus far published, it must be candidly admitted that no time has been gained, but with the work of preparing current numbers, much has been accomplished towards securing the best of material for the future, and with this in hand, the remaining numbers will appear at intervals of about three weeks, thus gradually closing up the present gap between dates of the numbers and actual dates of issue. It would be an easy matter to fill our paper, should we resort to the methods in vogue among many class journals of devoting a generous amount of space to the publication of "puffs" of various manufactured articles, contributed by the makers who seek this sort of advertisement; but it is a question with us whether our subscribers wish to pay for this matter. We do not wish it understood, however, that we intend to ignore the manufacturers and the many advances they are constantly making, but we intend to look at everything published with a view to its interest or usefulness to subscribers. In this way can THE BRICKBUILDER best advance the interests of both classes of its patrons.

The fifth number of *The Architectural Review* is one of unusual interest, and might certainly be referred to as a brick and terra-cotta number. It contains a beautiful series of drawings of the Madison Square Garden, New York, by McKim, Mead & White, redrawn for the *Review* by Harold Magonigle from the architects' working drawings, showing the general elevation of the tower and the Madison Avenue front, with details to a large scale of the top of the tower, the corner pavilions, the entrance arcade, and the central motive of the Madison Avenue front. The drawings are executed with great care, and are models of what such drawings should be. As our readers well know, this magnificent monument is executed in yellow brick and white terra-cotta, and those who have seen it can testify that no material could be better in which to execute rich and elaborate detail than this crisp, delicate gray-white terra-cotta. The *Review* editorially has a judicious critique of this building. In addition to the drawings of the Madison Square Garden is a detail of the gable, also in brick and terra-cotta, of the New York Life Insurance Building, in St. Paul, by Babb, Cook & Willard, of New York, taken directly from the architects' drawing. Not many architects, we believe, make such beautifully finished and careful working drawings as this.

The attention of non-subscribers is respectfully called to the anouncement on the inside back cover of this number of THE BRICKBUILDER. Their subscriptions are solicited for a trial year, and may begin with any number. For those who wish the paper from the beginning, we have reserved a number of copies of each number published, and these will be supplied at the regular subscription price. Those receiving rolled copies should remember that to all *subscribers* the paper is sent *flat*, well protected from injury in the mails.

CLAY BUILDING MATERIAL.

Clay working in all its varied forms has received in this country within the past quarter-century a great impetus. In no one of the mechanic arts has there been greater progress. This applies not only to the quantity of the production, but also to the character and scope of the material produced. A generation ago the short sentence, "a brick is a brick," would have told very nearly the whole story. Then the common red brick, with a small proportion repressed by hand for the better fronts, or for fireplace work, was about all from which the architect could choose. Indeed, so meagre was the supply then, and so rapid has been the development since, that probably many of our architects are scarcely aware of all the opportunities afforded them by the material as it is found in the market to-day. It can no longer be said that "a brick is a brick." Men of brains, of education, of enterprise, as well as of capital, are making clay working their life study, until out of the ground at our feet have sprung such forms and colors of clay building material as may well cause the student of the time to exclaim, as one of them lately has, "Surely, are we not approaching the age of clay?"

Every architect knows, in a general way, what is meant by common brick, pressed brick, fireproofing, architectural terra-cotta, floor tiles, roof and ceiling tiles. But is a "general idea" enough to enable the architect to use the material to the best advantage? May he not find in the following facts something which will be of value to him?

There are three specific methods in use by brickmakers, viz., the soft clay, the stiff clay, and the dry or semi-dry process.

The soft-clay process is the most ancient, and, so far as producing the best all-around results is concerned, is unquestionably the best. It consists of applying sufficient water to the mixture to thoroughly saturate and separate the parts, driving, practically, all air therefrom, and uniting the mixture in one homogeneous mass. The water is then dried out, causing the maximum of shrinkage, and leaving the brick in the best possible condition for burning. I will venture the assertion, that in the case of a soft-clay brick of proper mixture, hand made it may be, the drying process, which will cause it to shrink about eight per cent, is as beneficial in the direction of producing a good brick as any pressing, either by hand or power press.

It will be seen that this process is necessarily a slow and expensive one, on account of the time required to evaporate the water, which cannot be hurried beyond a certain degree, or the bricks will crack. It is, therefore, not a popular method with clay workers, especially where large quantities of the higher grade brick are produced, for in these days of *rush* and drive, and close competition, no process which is slow will meet with general favor. John Jones must save time and expense, even though it be at the sacrifice of quality, in order to undersell John Smith.

The stiff-clay process is a step in the direction of saving time and expense of handling and drying. It differs from the former only in the application of less water, and the bricks can thus be taken direct from the machine, repressed, and placed on the trucks for drying in the artificial dryer, which process requires only ten to twenty hours.

Time is thus saved at some cost of additional power, as the mixture being stiff is more difficult to manipulate. There is also a danger that the mixture will not receive that thorough "kneading" which is necessary for the best results.

The dry or semi-dry process differs radically from the two former. Instead of the application of water to the mixture, that element is eliminated as largely as possible from the very first. The clay is used dry, and the bricks formed by somewhat complicated, but very powerful, machines under such an enormous pressure (say forty tons to a brick) that the mixture is driven together in such a solid mass that it can be placed in the kiln direct from the machine and fired at once. This method of manufacture is *quick*, and less expensive than that where water is used, and is, therefore, popular where large quantities of brick are produced. It produces the most *mechanically* perfect brick, *i. e.*, straight, smooth, clean cut, and, *if vitrified in burning*, in other respects also a good brick.

There is vast significance to any student of this subject in the contemplation of the illustrations of the three kinds of *machines* used in the three processes above described, as they appear in the advertisements of their makers in such journals as *The Clay Worker* and *The Brickmaker*.

As "there are sermons in stones," so also there is a significant story in the market quotations for bricks, from the common red brick, at say $5 per thousand at the kiln, to the terra-cotta bricks of fancy color at $45 or $50 per thousand. The impression of the novice is that there is an enormous profit in the latter. This, however, does not follow. The careful selection of clays, the accurate measuring of the same for right proportions, the preparing of a quantity of pulverized burnt clay or "grog," the expensive machinery, the amount of power required in the very thorough manipulation of the clay, the skilled labor employed, and the risk and loss in producing the desired color, go a long way toward filling the gap between $5 and $50.

No art is brought to its highest perfection without some failures, and the wrecks of the numerous clay-working establishments "whose bones are whitening on the fields" in almost every State of the Union, while indicating individual failures, also indicate that American enterprise has taken hold of this industry in earnest, and in spite of some failures will carry it to its highest possibilities. We have already outstripped our English cousins, not only in the variety and scope of our machinery for working clay, but also in the quality of our production.

Another field new (for us) and intensely interesting is opening up before us, viz., the glazing and enamelling of terra-cotta for exterior and interior decoration. Enough has already been accomplished in this line to suggest its possibilities, and the near future is quite likely to bring some surprising developments.

Sketches and plans are already drawn for a seaside cottage with two floors, to be built entirely of clay material. Nothing else is to be used except the wooden window frames and doors, and possibly some of the floors and a few iron tie rods. The second floor is to be supported by the Guastavino arch, which will also form the ceiling.

With some twenty colors or shades of colors as now produced in clay material, together with colored glazes, it will be readily seen that some fine effects can be produced, and that, too, at a comparatively low cost. But the highest development of clay building materials depends upon the architect. The clay worker does his bidding. This is well illustrated in the fact that some fifty years ago an architectural terra-cotta works was started at Worcester, Mass. The production was of first-class quality. In the West Arch Street Presbyterian Church of Philadelphia are some capitals made by the Worcester company, and put in place forty-four years ago. In making an alteration in the church these capitals have been taken out and reset, and are as good to-day as ever. The pinnacle of the First Unitarian Church, Charlestown, North Carolina, was made in terra-cotta by the same parties, and was struck by lightning and shaken down at the time of the earthquake in 1885. I have a piece of it in my office. It is of excellent stock. But the architects of that day evidently did not appreciate the material, and the industry died for want of patronage.

Architectural terra-cotta requires the most carefully prepared mixture of any clay building material, the soft clay process, of course, being used. This special manipulation of the clay, together with a good proportion of pulverized burned material and, an expensive chemical to kill the efflorescence, increases the cost very largely; but the production itself, when properly burned, *is the ideal building material*, not only in strength and durability, but in a greater variety of texture, finish, and color than can be found in any other.

Where can the architect find a material which presents to him a greater variety, or with which he can better express his ideas of form and color?

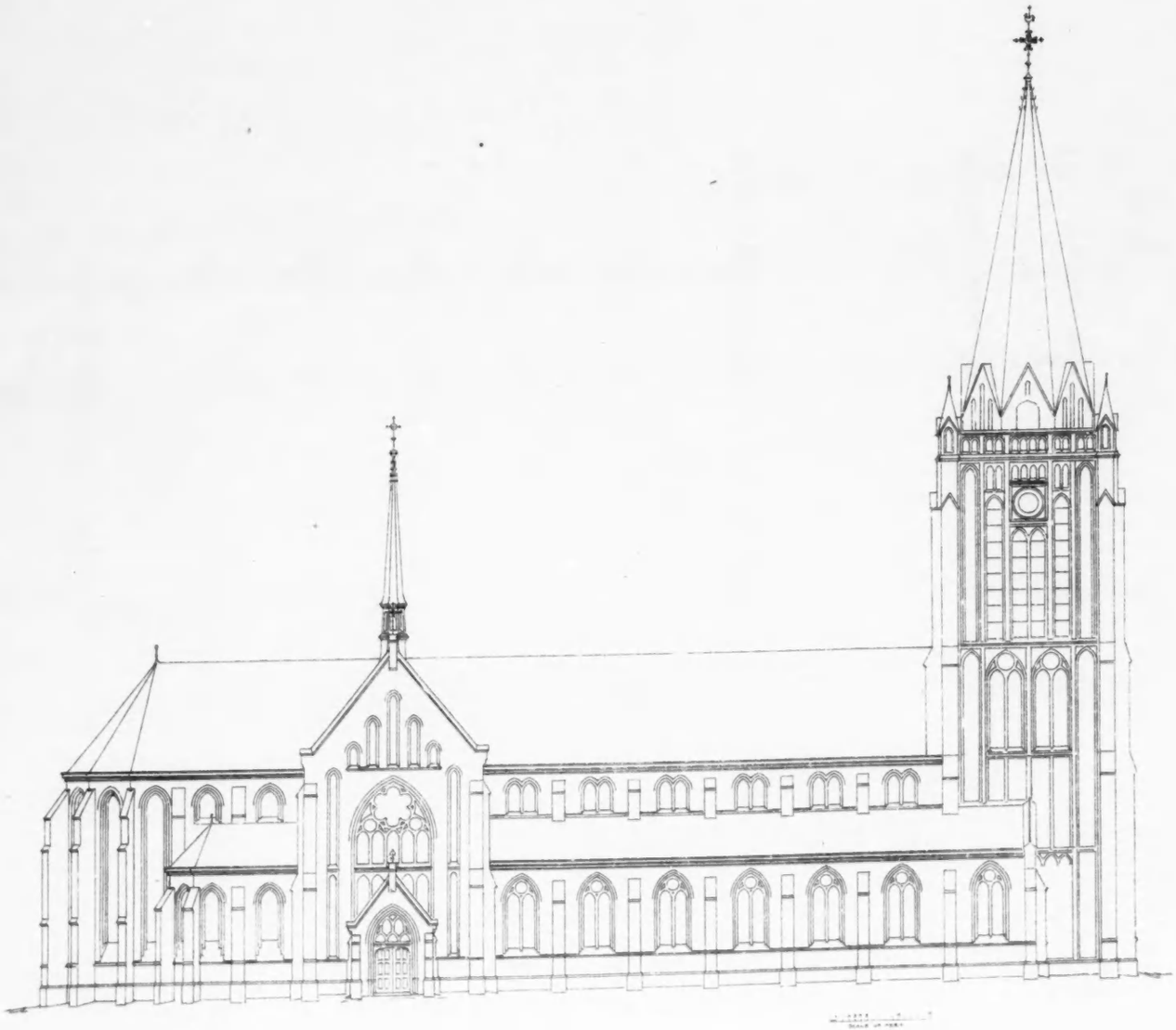
> "Not fashioned out of gold like Hero's throne,
> Not forged of iron like the thunderbolts
> Of Zeus omnipotent, or like other works
> Wrought by my hands at Lemos or Olympus,
> But moulded in soft clay, that unresisting
> Yields itself to the touch, this lovely form
> Before me stands, perfect in every part."

GEORGE M. FISKE.

It has been so long the custom to have statues of bronze, for mere durability, that the use of any other material for monuments that are exposed to the weather has not been suggested; nevertheless it must be an acknowledged fact that dark sculpture is not as attractive as light, and that if it were possible to obtain results with a material of the character of Della Robbia ware, for instance, there would be a distinct gain in the effect. With the renewed use of terra-cotta, it may be possible in the future to supplant bronze in many places.—*The Architectural Review.*

CHURCH OF S. MARIA DELLE GRAZIE, MILAN.

Third of a Series of Photographs of Foreign Brickwork.



Forbes Co.

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LONGITUDINAL ELEVATION.

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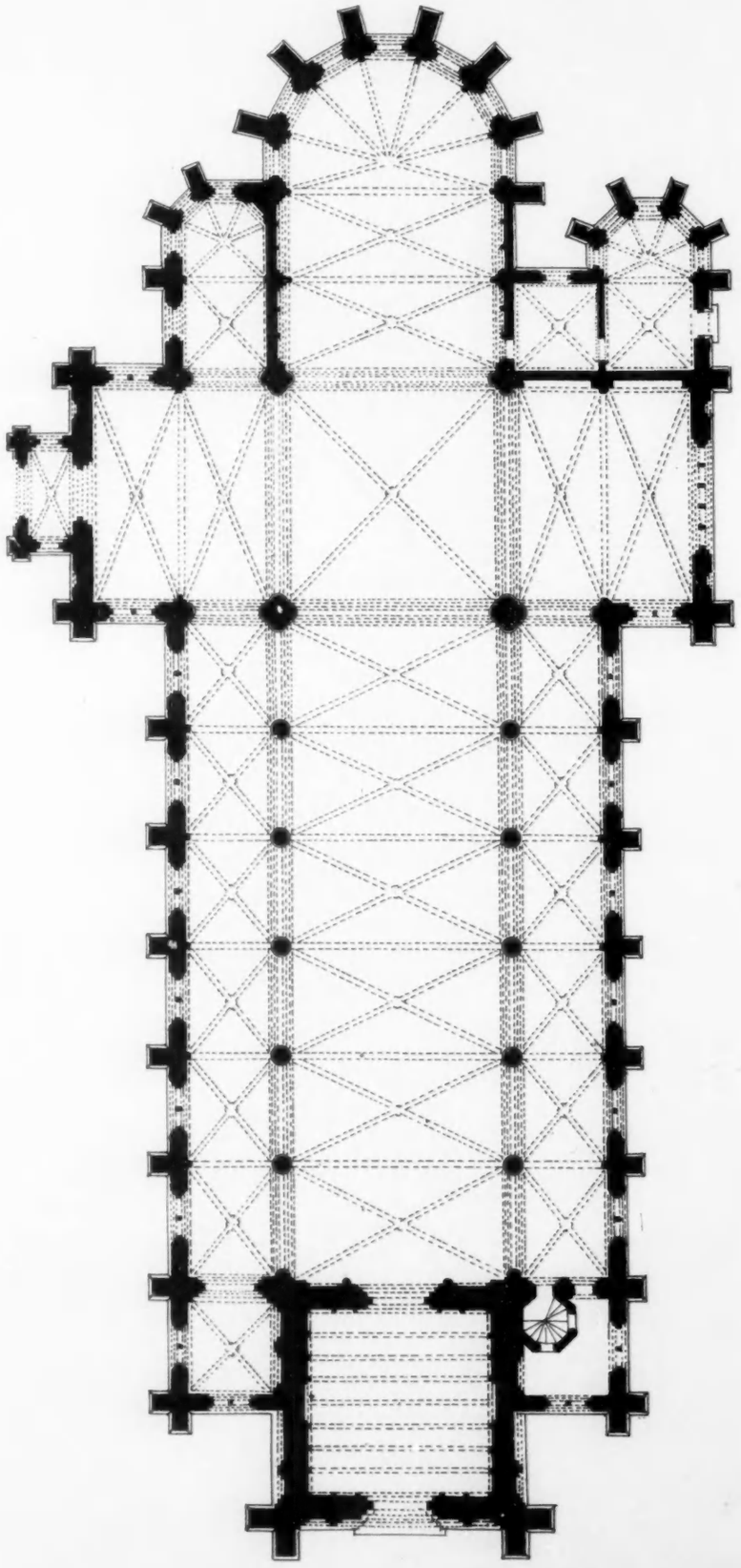

SCALE OF FEET

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PLAN.

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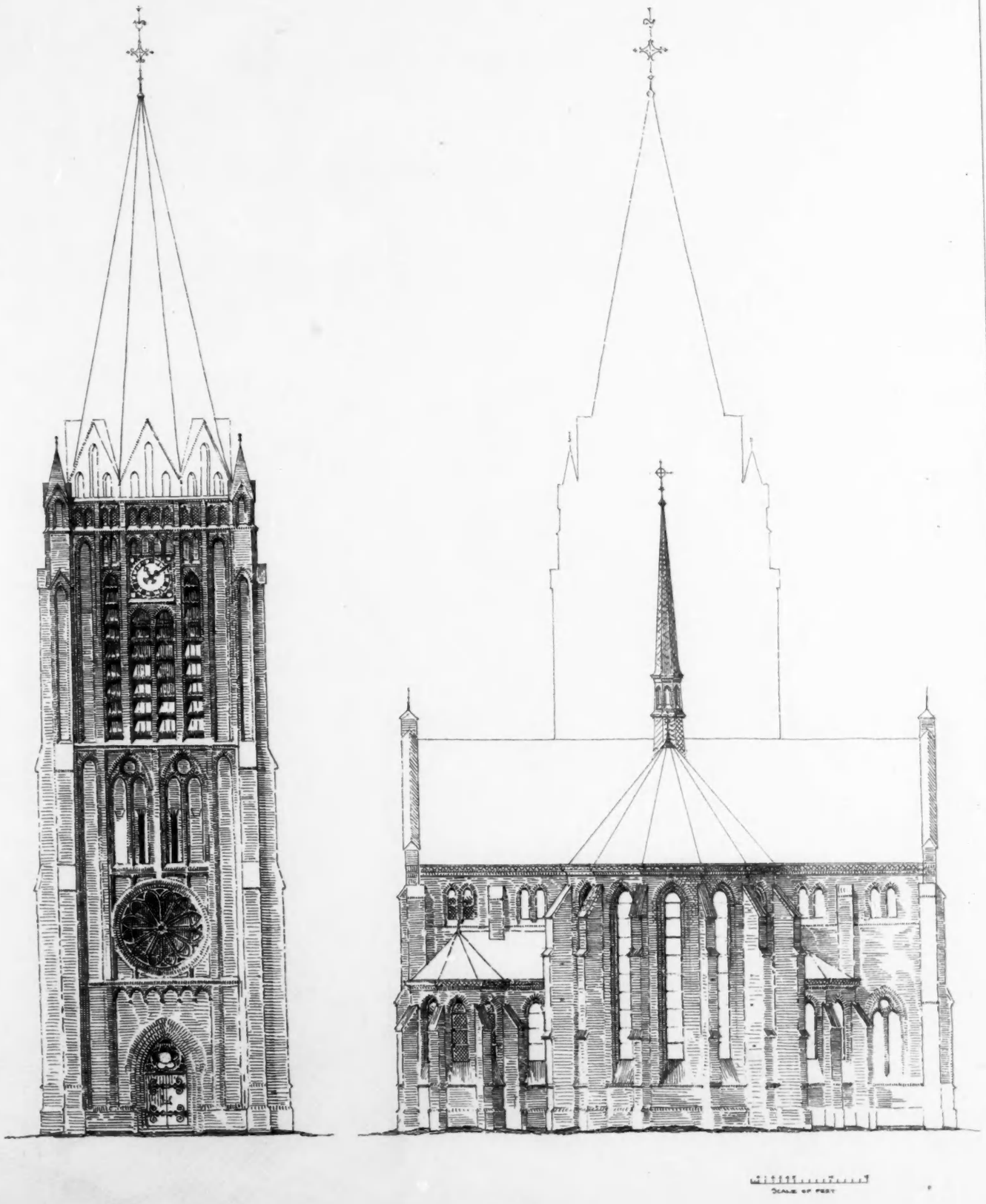

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ELEVATION OF TOWER. ELEVATION OF APSE.

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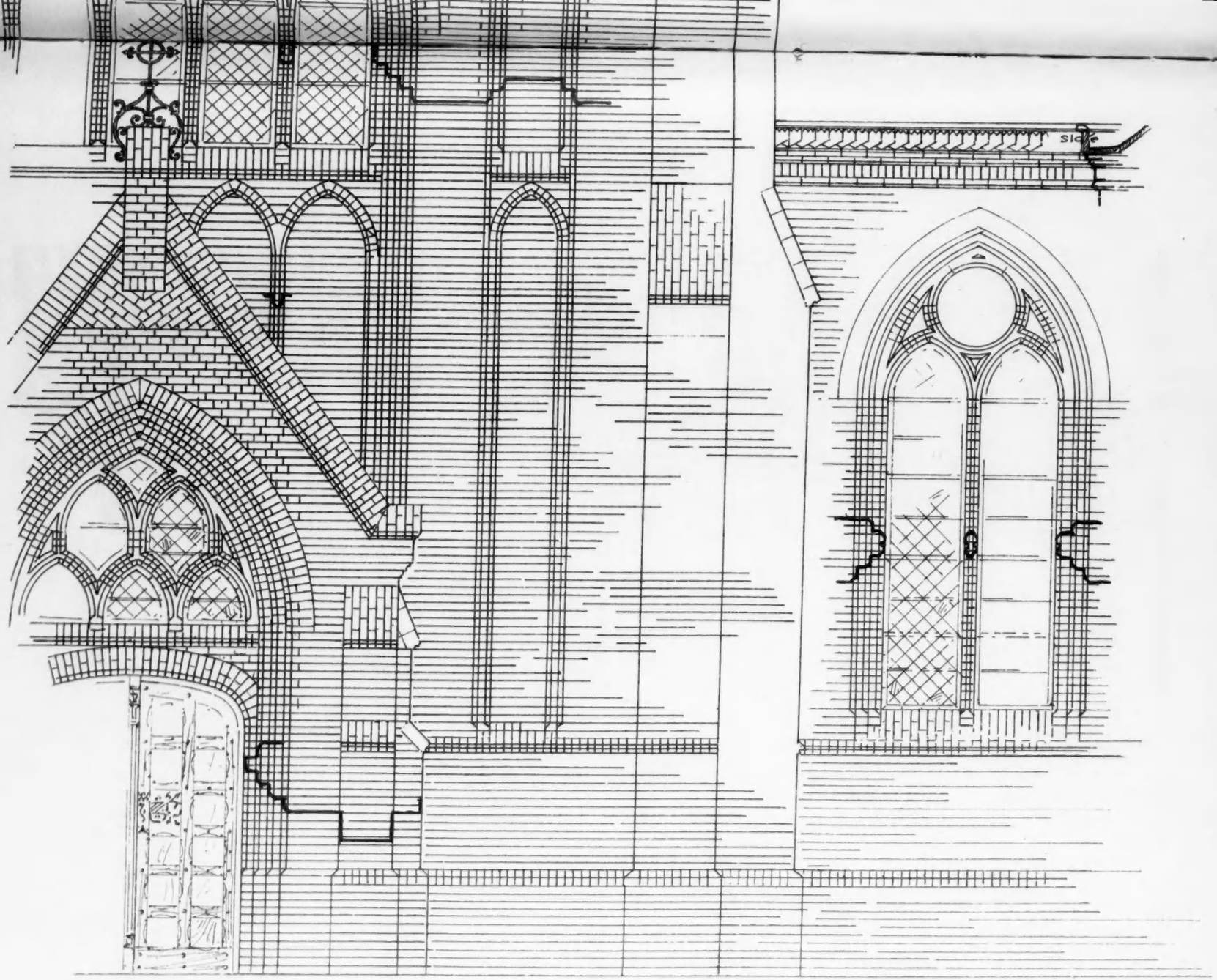

½ SCALE VIEW OF TRANSEPT GABLE.

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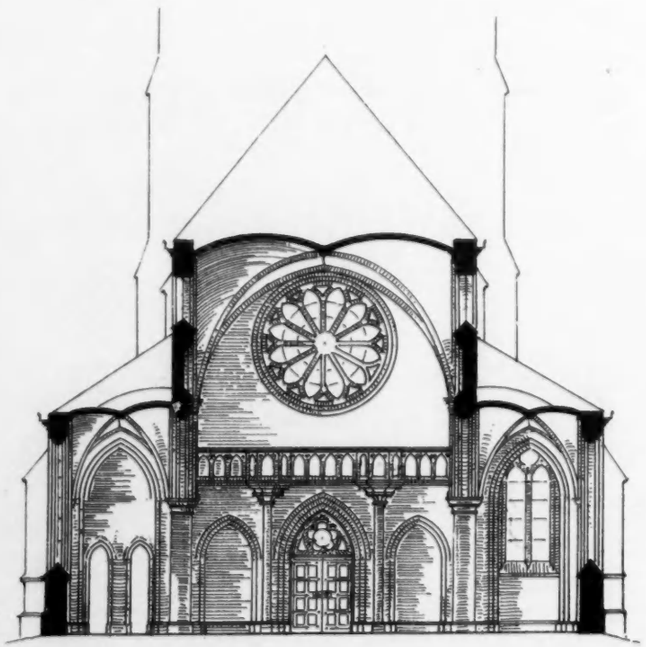

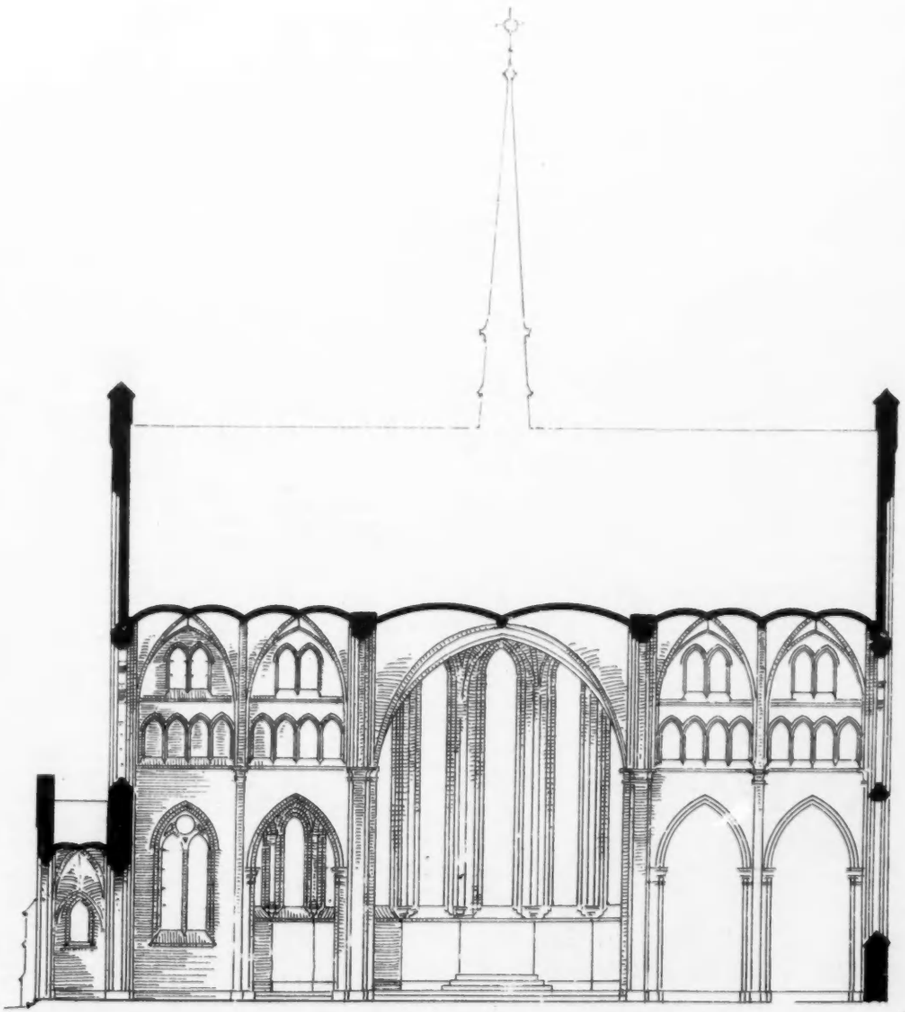

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TRANSVERSE SECTION.

SECTION THROUGH TRANSEPT.

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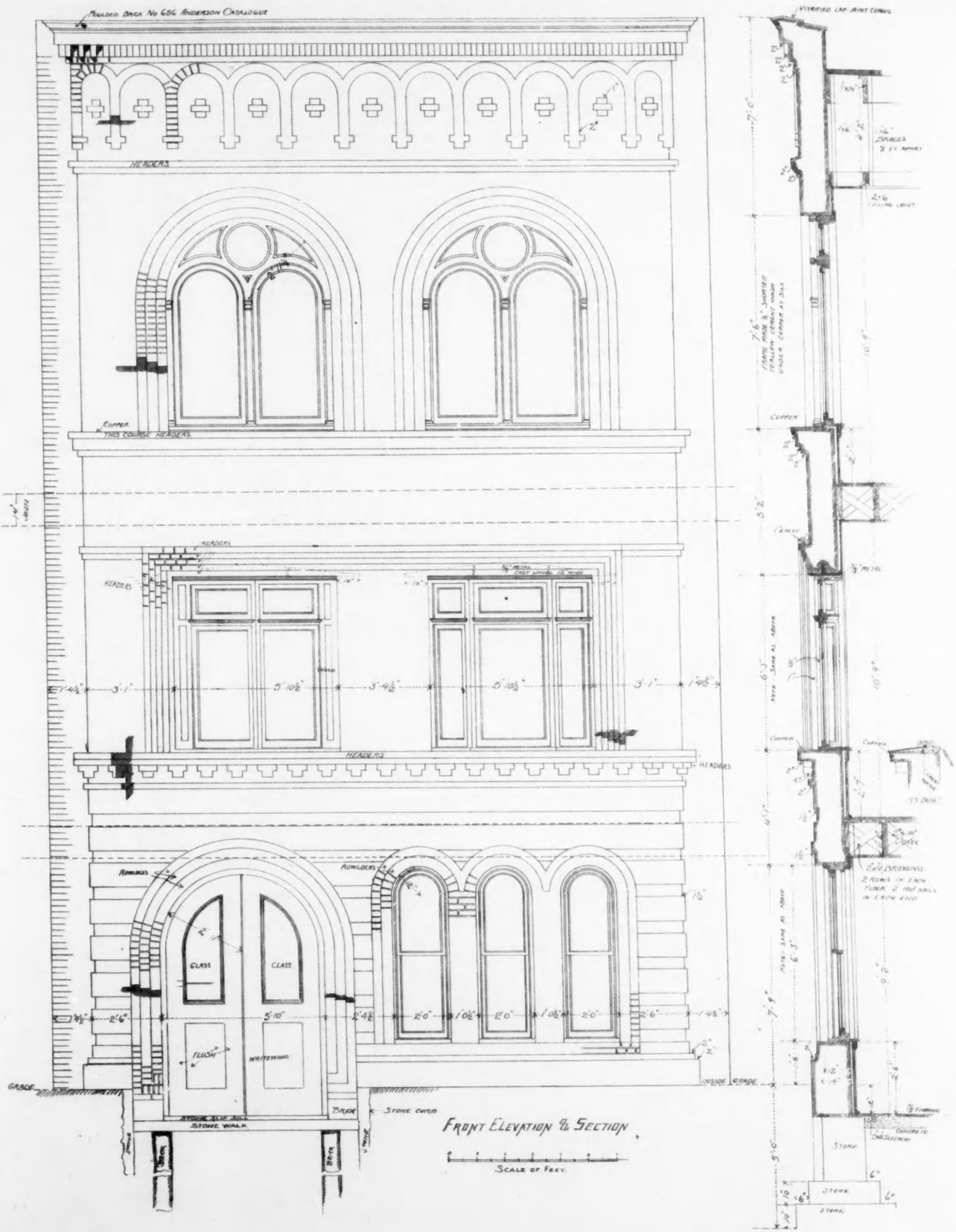
TRANSVERSE SECTION.



FRONT ELEVATION & SECTION

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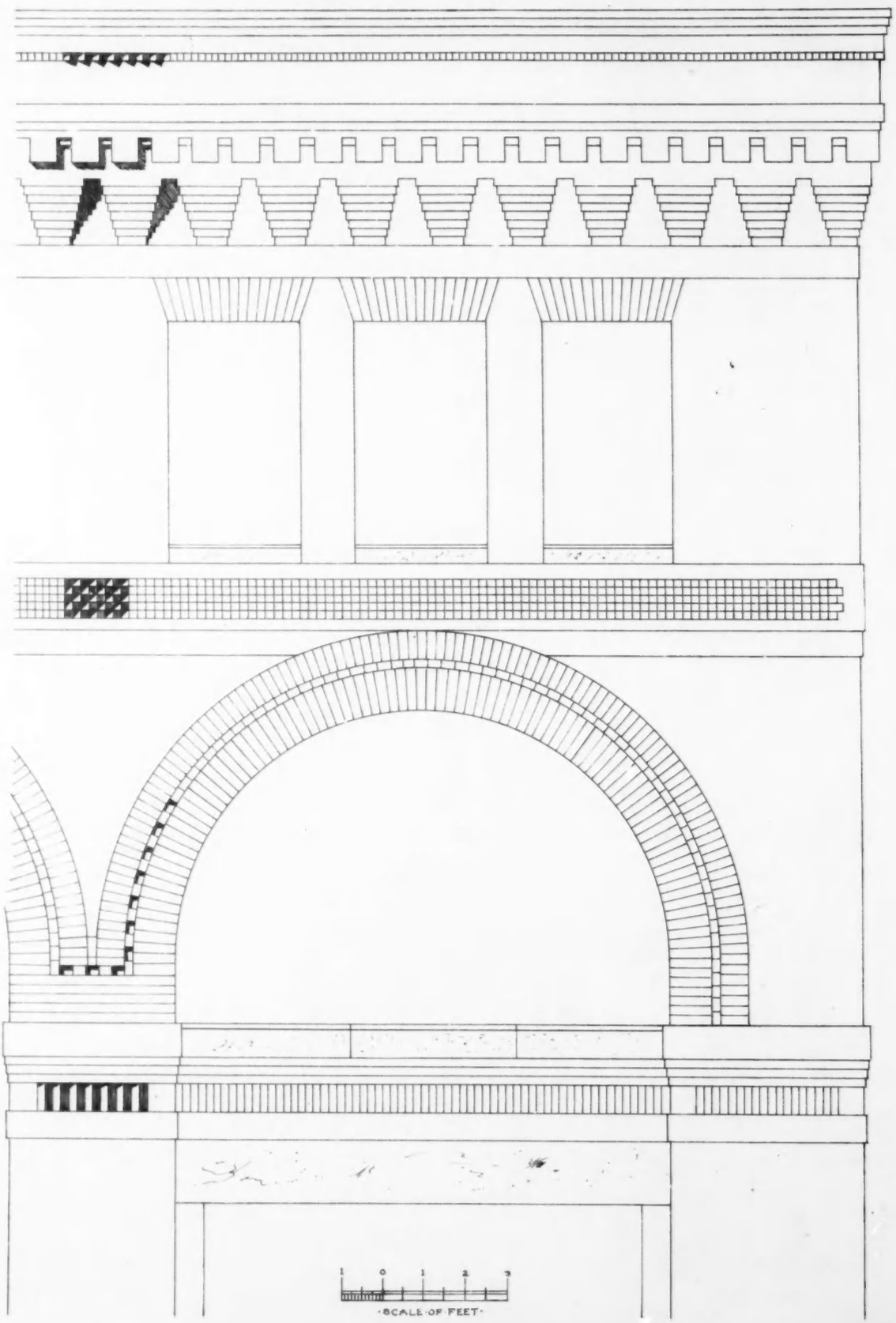
BUILDING FOR THE GIRLS' MUTUAL BENEFIT CLUB, CHICAGO.

JENNEY, MUNDIE & WAID, ARCHITECTS.



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DETAIL OF BUILDING CORNER CONGRESS AND PURCHASE STREETS, BOSTON.

CABOT, EVERETT & MEAD, ARCHITECTS.

BRICKS AND BRICKWORK.

A Lecture delivered at Carpenter's Hall, London, by Prof. T. Roger Smith, F. R. I. B. A.

Timber, stone, earth, are the three materials most used by the builder in all parts of the world. Where timber is very plentiful, as in Norway or Switzerland, it is freely used, even though other materials are obtainable, and seems to be preferred, notwithstanding the risk of fire which attends its use. Where timber is scarce, and stone can be had, houses are built of stone. Where there is no timber and no stone, they are built of earth, sometimes in its natural state, sometimes made into bricks and sun-dried, but more often made into bricks and burned. London is one of the places that occupy a spot which has long ceased to yield timber, and yields no stone, so we fall back on earth burnt into the form of bricks. Brick was employed in remote antiquity. The Egyptians, who were great and skilful builders, used it sometimes; and, as we know from the Book of Exodus, they employed the forced labor of the captives or tributaries whom they had in their power in the hard task of brick-making; and some of their brick-built granaries and stores have been recently discovered near the site of the battle of Tel-el-Kebir. The Assyrians and Babylonians made almost exclusive use of brickwork in erecting the vast piles of buildings, the shapeless ruins of which mark the site of ancient Nineveh and of the cities of the valley of the Euphrates. Their bricks, it is believed, were entirely sun-dried, not burnt to fuse or vitrify them as ours are, and they have consequently crumbled into mere mounds. The Assyrians also used fine clay tablets, baked in the fire, in fact, a kind of terra-cotta, for the purpose of records, covering these tablets with beautifully executed inscriptions, made with a pointed instrument while the clay was soft, and rendered permanent by burning. We don't know much about Greek brickwork; but it is probable that very little brick, if any, was made or used in any part of Greece, as stone, marble, and timber abound there; but the Romans made bricks everywhere and used them constantly. They were fond of mixing two or more materials together, as, for example, building walls in concrete and inserting brickwork at intervals in horizontal layers to act as courses of bond. They also erected buildings of which the walls were wholly of brick. They turned arches of wide span in brickwork; and they frequently laid in their walls at regular distances apart courses of brick on edge, and courses of sloping bricks, to which antiquaries have given the name of herringbone work.

The Roman bricks are interesting as records, for it was customary to employ the soldiers on brickmaking, and to stamp the bricks with names and dates; and thus the Roman bricks found in this country give us some information as to the military commanders and legions occupying different parts of England at different periods.

Flue bricks for the passage of smoke under floors and in other situations are sometimes found. The Roman brick was often flat and large,—in fact, more like our common paving tiles known as foot-tiles, only of larger size, than like the bricks that we use. They vary, however, in size, shape, and thickness. Not a few of them are triangular in shape, and these are mostly employed as a sort of facing to concrete work, the point of the triangle being imbedded in the concrete and the broad base appearing outside. After the Roman time, brickmaking seems to have almost ceased in England for many centuries. It is true, we find remains of a certain number of massive brick buildings erected not long after the Norman Conquest; but on examination it turns out that these were put up at places where there had been a Roman town, and were built of Roman bricks, obtained by pulling down previous buildings.

The oldest parts of St. Alban's Abbey, and portions of the old Norman buildings at Colchester, are examples of this sort. Apparently timber was used in this country almost exclusively for humble buildings down to the sixteenth century. This is not surprising, considering how well wooded England was; but stone served during the same period for important buildings almost to the exclusion of brick. This is more remarkable as we find stone churches and the ruins of stone castles in not a few spots remote from stone quarries, and to which the stone must have been laboriously conveyed at a time when roads were very bad and wheel-carts were scarce.

About the time of the Tudors, say the reign of Queen Elizabeth, the making of bricks was resumed in England, and many dwelling-houses and some few churches were built of good brickwork in that and succeeding reigns. We find in such buildings as Hampton Court Palace, St. James's Palace, and Chelsea Hospital examples of the use of brickwork in important buildings near London at later dates.

The fire of London in 1666 gave a sudden check to the use of timber in house building in the metropolis. Previous to that date the majority of houses had been of a sort the most ornamental examples of which were copied in "Old London" at the Colonial Exhibition. The rebuilding after the fire was largely in brick; and in the suburbs, in the latter part of the seventeenth and eighteenth centuries, many dignified square brick mansions, with bold, overhanging eaves and high roofs and carved ornament, entered through a pair of florid wrought-iron high gates, were built, some few of which still linger in Hampstead and other suburbs. The war time at the beginning of this century was a trying time for builders, with its high prices and heavy taxes, and some of the good-looking brick buildings of that day turn out to have been very badly built when they are pulled about for alterations. With the rapid and wonderful increase in population and wealth in this metropolis during the last fifty years, a vast consumption of brick has taken place, and a year or two back it was reported by the commissioners of police that the extensions of London equalled in a year seventy miles of new house property practically all of brick.

Bricks were heavily taxed in the war time which I have referred to, and the tax was levied before burning. There was a maximum size for the raw brick, which, it was supposed, served to keep bricks uniform, and the expectation was entertained that when the duty came off, many fancy sizes of bricks would be used. This has not, however, turned out to be the case. The duty has been entirely taken off for years; but the differences in the size of bricks in England are little more than what is due to the different rate of shrinkage of brick-earth under burning. It must not, however, be supposed that they have always, and in all countries, been of about the same dimensions. The size and proportions of bricks have varied extremely in different countries, and in the same country at different periods. Some bricks of unusual shapes have also been employed from time to time. Other countries besides England possess districts which from various circumstances have been, more or less, densely built on, but do not yield much stone or timber; and, accordingly, brickwork is to be met with in many localities. Holland and Belgium, for example, are countries of this sort; and the old connection between Holland and England led to the introduction among us, in the reign of William III., of the Dutch style of building, which has been in our own day revived under the rather incorrect title of Queen Anne architecture. Another great brick district exists on the plains of Lombardy and the northern part of Italy generally, and beautiful brickwork, often with enrichments in marble, is to be found in such cities as Milan, Pavia, Cremona, and Bologna. Many cities and towns in Northern Germany are also brick built, and furnish good examples of the successful treatment of the material.

In some of these German buildings, indeed, very difficult pieces of construction, such as we are in the habit of thinking can only be executed in stone, are successfully attempted in brick. For example, they execute large tracery windows in this material. Great brick gables, often with the stepped outline known as crow's feet, are an excellent architectural feature of these German brick-built towns.

In parts of France, also, ornamental brickwork was, from time to time, made use of, but not extensively. It is not necessary to go very minutely into the manufacture of bricks; but, perhaps, I ought to say a word or two on the subject. Good brick-earth is not simple clay, but a compound substance; and what is essential is, that it should burn hard, or in other words, partly vitrify under the action of heat. The brick-earth is usually dug up in the autumn, left for the frosts of winter to break it up, and worked up in the early spring. The moulding is to a very large extent done by hand, sometimes in a wet mould, sometimes in a dry sanded mould, and the bricks are first air-dried, often under some slight shelter, as the rain or frost damages them when fresh made; and then when this process has made them solid enough to handle, they are burned and sorted into qualities. The ordinary or stock brick of London and the neighborhood presents a peculiarity, the origin of which is not known, and which is not met with, so far as I know, in other parts. Very fine coal or cinders is mixed with the brick-earth, and when the bricks are fired, these minute particles of fuel scattered through the material all of them burn, and serve to bake the heart of the brick. Stock bricks are burnt in a clamp made of the raw bricks themselves with layers

of fuel, and erected on earth slightly scooped out near the middle, so that as the bricks shrink they drop together and do not fall over sideways. Most other varieties of bricks are kiln burnt. A very large number of inventions for making bricks by machinery have been patented. If you have occasion to look through the specifications of these patents, you will find four or five main ideas appearing and reappearing, and only here and there an invention which is, to some extent, different from the others. A great majority of these inventions include machinery for preparing the clay or brick-earth, so that it may be dug up and filled into a receptacle, and worked up, screened from pebbles, and made fit for use in a short time, so as not to have to wait a whole winter.

This is done in some sort of pug-mill. A pug-mill is a machine consisting of a large cylinder with a central shaft passing through it from top to bottom. Knives or blades are arranged spirally in the shaft, and other blades project into the interior of the cylinder from the walls of it. The material, after being screened, is fed into this at the top, and properly moistened. The shaft is caused to rotate and the blades divide and subdivide the material, forcing it always downward so that it at last escapes at the bottom of the pug-mill in a continuous stream of moist well-worked-up clay issuing with some force. In one type of machine this clay stream is forced through a square orifice from which it comes out of the section of a brick, and by a knife or wire or some other means it is cut into lengths. In another type of machine there is a large revolving drum working on a horizontal axis, with open moulds all around its edge. The clay enters these moulds, and there is an arrangement of plungers by which it is first compressed within the mould, and then forced out on to an endless band or some other contrivance that receives it. A third type of machine has the moulds in the flat top of a revolving table, which, as it turns, carries each mould in succession, first to a part where it is filled from the pug-mill, next to where its contents are compressed, and lastly to where they are pushed out for removal. However made, the brick, when moulded, dried, and burnt and ready for market, belongs to some one sort, and is distinguished from other sorts by its size, color, quality, and peculiarities. The sorts of brick that are to be met with in the London market are very varied. To enumerate them all would make a tedious list; to describe them all would be equally tedious. I will endeavor, however, to give some idea of the most conspicuous of them. We will begin with that family of bricks of which the London stock brick is the type. It has been said these are clamp-burnt, and almost all the internal brickwork, and not a little of the external, of the metropolis is of stock brickwork. A good London stock brick is an excellent brick for general purposes, but cannot be called beautiful. Considering the vast quantity of brickwork done in the metropolis, it is a matter for congratulation that such sound materials as good stock bricks, stone lime, and Thames sand are so easily procurable and can be had at a price that puts them within the reach of all respectable builders. When a clamp has been burnt its contents are found to have been unequally fired, and are part of them underburnt, part well burnt, part over-burnt. They are sorted accordingly into shuffs, grizzles, stocks of two or three qualities, shippers and burrs. Several sorts of malm stocks, which are superior in color and texture, are made and are used for facing bricks and for cutting; and what are called paviors, which are dark and strong bricks, are also made. The London stock is erroneously, but usually, described as gray; it is really of a piecrust yellow of various tones. Sometimes it is the same color when cut, but the hardest stocks are of a dark dirty purple or brown, or sometimes nearly black inside. A stock brick is rarely quite square or quite true; its surface is often disfigured by black specks and small pits, and a stack of them often look uninviting; yet a skilful bricklayer, by throwing out the worst, by placing those of bad colors or much out of shape in the heart of the wall, and by bringing to the front the best end or side of these bricks which form part of the face, can always make the bricks in his work look far better than in the stack.

Another important group is the group of Suffolk and Norfolk bricks, red and white. These are very largely employed as facing bricks and for arches and cut mouldings. Moulded bricks are also to a large extent made of the same material. The bricks are brought to London in large quantities; they have a sanded face, are mostly square, true, and of uniform color, but they are usually porous, soft, and absorbent. Still, they are in great demand as facing bricks, and the moulded bricks enable the architect to produce many architectural effects at a moderate outlay. These fields furnish many sorts of bricks, which are called rubbers, and which are employed (as malm stocks also are) for arches of the more elaborate sort, where each brick is cut to its shape and rubbed true, and for mouldings, and even, sometimes, for carving. Mouldings that are formed by cutting the bricks can be got more perfectly true than when moulded bricks are used; but the expense is greater, and when it is done the material is less durable, for the softer sorts of brick are naturally used for cutting, and the moulded face is less sound than the original burnt face of any brick. Red bricks are to some extent made in fields within easy reach of London; but the best come from some distance. Red Suffolk bricks have been alluded to; there is a considerable importation of red Fareham bricks, brought all the way from the vicinity of Portsmouth. These are good both in quality and color. Good red bricks are also now made at Ascot, and are being used to a considerable extent in the metropolis. A strawberry-colored brick from Luton has been extensively used at Hampstead; it is hard, and of a color that contrasts well with stone, but not very pleasing used alone. Glazed bricks of all colors are obtainable; they are usually very hard and square, and the use of them, where an impervious glazed face is required, as, for example, in a good stable, is better than the employment of glazed tiles, in the employment of which there is always a possibility of part of the lining becoming loose or falling off. There is a difficulty in obtaining a large quantity (of some colors at least) exactly uniform in tint. Bricks with a very hard face, but not glazed, are obtainable. What is called a washing brick is now made in various colors, adapted for the lining of interiors, and there are hard bricks of a very pale straw color, known as Beart's patent bricks, made, I believe, of gault clay, which were some years ago bought up by the Great Northern Railway in large numbers. These bricks have the peculiarity of being pierced with holes about one half inch in diameter, passing quite through the brick, and they are extremely hard, partly because these holes permit the hot air and smoke in the kiln to approach very near to the interior of the brick. I am of opinion that the glazed or dull qualities of hard bricks might with great advantage be often introduced into London streets. What we want is something that will wash. The rough surface of stocks or Suffolk facing bricks catches the black in the London atmosphere, and gradually gets dark and dull. A perfectly hard face is washed clean by every shower.

A good many years ago I built a warehouse with stock bricks, and formed the arches, strings, etc., of bricks with a very hard face, and as I expected, the effect of time has been to make these features stand out far better than when they were fresh; in fact, the only question is whether they have not now become too conspicuous. To turn to the bricks in the London market, we have fire-bricks made of fire-clay, and almost vitrified, and capable of standing intense heat. These are used for lining furnaces, ovens, flues, etc. Then we have almost, if not quite, as refractory a material in Staffordshire blue bricks used in various forms for paving channels, jambs of archways, etc. There are also small bricks called clinkers, chiefly used for stable paving.

Dutch clinkers, formerly imported largely from Holland, were small, rough bricks laid on edge, and affording a good foothold for the horse. Adamantine clinkers, made of gault clay, are much used; they must have chamfered edges, otherwise they make too smooth a floor for a stable. Many other varieties are obtainable in London, and are more or less used, but these are the most prominent. In many parts of England special varieties of brick are to be found, and every here and there one falls upon a good brickmaker who is able to produce good moulded or embossed or ornamental bricks, such as those which have been supplied to me years ago by Mr. Gunton, and more recently by Mr. Brown, both of Norwich, or by Mr. Cooper of Maidenhead.

It is of importance to those whose business it is to look after or engage in building operations, that they should early learn what to look out for in each material. Of course a man only becomes a judge of bricks or timber or stone by experience; but he is far better able to take the benefit of experience when it comes to him if he knows from the first to what points to direct attention. Wherefore I make no apology for trying to put before you the points of a good brick, and in so doing I shall partly quote from a memorandum published now a good many years ago by the Manchester Society of Architects. A good brick is uniform in size; standard 9 by 4½ by 2½ in.; weight about 7 lbs. each, equals 110 lbs. per foot cubic; is rectangular, true faced, but only one end and one side need

be smooth, has no print sinking on either face, but a hollow on one or both beds. When saturated with water, a brick should not absorb more than twenty per cent of its own weight of water, should absorb it reluctantly, and part with it freely at ordinary temperatures. It should be uniformly burnt, should be sound, free from cracks, flaws, stones, lumps of any kind, but especially lumps of lime, should be of a good color for its sort (whether red, yellow, or white), should have a metallic clang when two bricks are struck together; when broken should be sound right through, should be tough and pasty in texture, not granular, and should require repeated blows to break it rather than one hard blow (such bricks will withstand cartage and handling best). So much for bricks.

(*To be continued.*)

BRICK GABLES.

The gable has been made one of the strongest features of brick architecture, and has been treated in a variety of ways. The broken outline in which curves are united with straight lines, and pediments are combined with curvilinear copings, is essentially a type of gable developed from brick, for we see that in all brick countries the ornamental gable has been the pronounced feature in the architecture. In Belgium and Holland the forms that are found are, as all architects know, of the most varied description, from the plain stepped or crow's-foot design, to the most "rococo" form of curvilinear outline. The curves are sometimes seen reversed like the Louis Quatorze or Quinze period, and terminate in twists, scrolls, or points of the most elaborate design. In England the Elizabethan or Queen Anne buildings show a less profuse and wanton arrangement; the gables are generally made up of simple curves placed with their convex sides outwardly in one place and inwardly in another, or of ogee curves terminated by a straight string with a pediment superimposed. Very little cutting is necessary in designs of this character; the bricks to the curved portions can be of moulded or plain rectangular shape. The coping bricks may be perfectly plain, set up on a thin moulded course, and projecting 2½ inches on the face, or be quite flush with the work below, only a double tile course projecting under it. In more ornamental designs the bricks are moulded on the under edge, specially made for the purpose, or the upper fillet is formed of two courses of tiles set in cement. The pedimental portions are composed of bricks with ovolo and square members and ogee for the top member of the pediment, and, of course, project on each face of the gable wall so covered. The upper course ought to be made of large, purposely moulded bricks, with close joints and set in cement.

Considerable care is required in forming these coping courses. The joints should properly break bond; the bricks themselves should be hard and well burned, and be well grouted in cement mortar. Owing to the porosity of the bricks or joints, lead is sometimes used as a covering to the top course; but this expedient ought to be avoided if possible. The plain flush coping, cut to the contour of the gable, and having two or three projecting courses of tiles laid beneath in cement mortar, is one of the most effectual modes of keeping the rain from penetrating the gable wall, as the projecting tile course, or "tile creasing" as it is called technically, throws off the water like a drip moulding from the faces of wall. For a moulded brick coping two courses may be used; the lower course may have a cavetto, or cyma reversa, worked on the edge, either placed flatwise or, if greater boldness is desired, on edge, and above this a plain course of bricks on edge, or three courses of tile can be laid as a fillet. The aim of the designer of brick mouldings for this purpose should be to produce one or more sharp lines of shadow, not too large or deep, or it will look heavy to the eye. The mouldings ought to be simple and effective with bold squares, instead of divided into several members which would never be seen below. We have seen gables finished with moulded cement copings than which nothing looks worse or more patchy. If brick is used for the gable wall, let it appear as the finish: do not shirk the trouble of a coping, or the art of the brick setter will be compromised just where it should be evident. For pediments the moulded bricks may consist of the cymatium, in the oblique sides, with fillet underneath, the horizontal members will be a fillet and corona, and beneath this a fillet and echinus, or quarter round. With these few members the effect will be bold. The corona, with its fillet joined with a small cavetto, throws a deep shadow, which is relieved by the lowest member, or quarter round.

To obviate the exposed coping the roof is often carried over the gable, the latter being finished by a series of mouldings in purpose made bricks. The upper member may be a cyma recta with fillet, the second row a plain square profile, and the underneath a cavetto or cyma reversa. Of course this kind of finishing does not admit of ornamental outlines; the sides are straight so as to allow the roofing to be continued over the gables. We wish to call attention to the necessity of obtaining moulded angle or apex, and return bricks for the gables so as to insure sharp mitres at these points. It was mainly the difficulty of getting moulded bricks made for gables that induced our forefathers to employ stone and cement for copings, both of which materials required often to be painted to prevent the absorption of moisture.

We do not say anything against a stone coping when a durable material can be obtained that will weather well. Many of our modern Tudor buildings of brick and stone may be mentioned in which the two materials are combined. But if good moulded brick or terra-cotta can be had, why should stone be employed, as it adds to the cost and is less durable than good brick. The effect has had something to do with the matter. A brick edifice with stone dressings is more showy, and the relief of the two colors is preferred by many people. The architect must be the judge in every case. If a good weather stone can be had at a moderate cost, the relief is of some value; but our experience of many modern buildings in which a soft freestone has been used for dressings has proved to us the value of moulded brick and terra-cotta when it can be obtained of good quality. — *Building News.*

REVIVAL OF BRICKWORK IN ENGLAND.

One of the recent, and as far as it relates to architecture, one of the most important revivals of this generation is that of the art of brick cutting. Brickwork began to revive some forty years ago, when the reign of stucco and cement had come to an end, and when the mania for disguise had ceased to enthrall architects and their patrons. The change was brought about partly by a sort of moral reaction against shams of all kinds, and partly by a desire to reintroduce the vernacular brick style of building of the Tudors, especially that of Henry VIII. and Elizabeth. A new impetus was given to brick manufacture, and architects began to reproduce, with more or less tameness, the ornamental gables and chimneys of Tudor houses; but it was soon discovered that the practical bricklayer was not equal to the task put upon him; he was unacquainted with the art of cutting and setting bricks for ornamental gables, chimneys, and oriels. A new school of bricklayers was necessary before a brick style of architecture could be introduced worthy of the traditions of Tudor times, and of the subsequent Dutch or Queen Anne period. A quarter of a century has accomplished a good deal. Thanks to the Venetian Gothic craze, and the Queen Anne revival, we have now a few artist workmen in the craft equal to any of their predecessors. We owe to the latter style a resuscitation of the long dormant art of brick-cutting, moulding, and carving. To Mr. Ruskin, the late Mr. Street, Mr. Norman Shaw, and Mr. Alfred Waterhouse, worthy pioneers in the movement, we owe brick buildings that will compare with those of the previous century. If our brick architecture has not yet achieved a definite place in our recent history, it is because the trade of brickmakers and the crafts engaged in the work have failed to reach the standard which they attained in other countries and times. The practice of cementing brickwork has seriously hindered the progress of the art; the brickmaker benefited by thus being able to manufacture inferior bricks, and the workman engaged in laying was enabled to hide an unskilful hand. When we look back to the brick buildings of the days of the Tudors, or even to the later time of Jones and Wren, we observe that the art derived much of its precision and beauty from the brickmaker; the bricks were well and truly made, moulded into good forms, and of pleasing color. — *The Building News.*

Many architects in specifying the quality of brickwork insist on the uniform color of the bricks, in almost complete forgetfulness of the fact that the old and best examples show a mixture or blending of the tints produced by the various constituents of the clay and the great heat of wood burning. In the remains of brick buildings at Hampton Court, Porchester Castle, Layer Marney, and other places, we notice a soft mingling of color, due to weather stains and age, which constitutes the charm of old brick architecture. — *English Ex.*

THE BRICKBUILDER COMPETITIONS.

COMPETITION NO. 5.

A BRICK FIREPLACE.

Programme. It is desired to design an ornamental brick fireplace to form the principal feature of the hall in a residence of moderate cost. The hall will have a tile floor, and be finished in quartered oak, with panelled dado four feet high. The ceiling will be nine feet high. It is the intention to carry the brickwork to the ceiling, thus securing an overmantel of brick. The fireplace opening is not to exceed four feet wide and two feet six inches high, while the whole width of the fireplace is not to exceed ten feet. It is supposed to be placed in the middle of a wall space of twelve feet. In addition to indicating the catalogue numbers of the ornamental bricks used, the cost of all the face and ornamental bricks necessary to build the fireplace must be given. This can be secured by sending an exact schedule of the bricks required to the manufacturers, and it is stipulated that no bricks shall be used not advertised in THE BRICKBUILDER prior to the August number. The bricks of one maker must be used throughout the design.

There will be prizes awarded as follows: First, $15.00; second, $10.00; third, $5.00; fourth, $3.00. Five fifth prizes of subscriptions to THE BRICKBUILDER for 1892. Drawings must be made to a scale of an inch to the foot, and must include plan, section, and front and side elevations, drawn upon a sheet 14 x 20 inches, without border, or any lettering save device by which the design is distinguished, cost of stock, and the indications of dimensions and bricks used. All designs to be sent to the office of THE BRICKBUILDER, prepaid, by Oct. 1, 1892. Stock mantel designs of manufacturers are barred from competition.

The attention of all architects, designers, and draughtsmen is directed to the competitions announced in the April number, of three cornices and three chimneys, and it is hoped that many will enter both of these competitions. Should the number of good designs largely exceed the number of prizes, it is very probable the publishers of THE BRICKBUILDER will purchase the use of the best of the designs failing to receive prizes, so that every good designer is practically certain of receiving something for his work. It is not improbable that many of these designs will be wanted by the companies whose bricks are used, and designers are therefore urged to confine their selection to the companies advertised in THE BRICKBUILDER, all of which are progressive, and as fully appreciative of the necessity of good design in brickwork, as they are to the necessity of mechanical perfection in the bricks they manufacture. A copy of the April number will be sent free to every intending competitor.

HARTFORD, CONN., July 6, 1892.

Editors Brickbuilder:

DEAR SIRS, — We are pleased with your paper, and urged our boys to enter the competitions. They are now glad they did.

We highly approve your action and hope you will continue the series. We would suggest more trials in composition of fronts, or angles, or gateways — or a combination of windows, including a rose, for the wall of a church. And would it not be well to specify some historic style for some of these? Various types of Romanesque, Renaissance, or Gothic could be readily worked out with the patterns obtainable.

We regret that your jury did not criticise the competitive attempts published in your last issue, for boys that will design such things do not, of course, know why they are wrong, and a little judicious criticism would doubtless be of help to them.

Yours very sincerely,

COOK, HAPGOOD & CO.

THE ILLUSTRATIONS.

Plates 33 to 38. The BRICKBUILDER'S Design for a Church by J. A. Van Straaten, Jr., Boston.

In order to promote the more general use of brick the accompanying plates are given as an example of good architectural treatment in brick. The problem of a church was selected as one of wide application and one in which the architectural capabilities of brick could readily be illustrated. No attempt was made to produce a design which should be adopted in any given case, but rather a typical design which would give opportunity to show what can be accomplished by a simple and appropriate use of brick both inside and outside of the building. The drawings really speak for themselves; they show an arrangement of walls, columns, pilasters, arches, vaults, windows etc., connected so as to show the application of brick to a building of some elaboration. The style chosen is Gothic of the 15th century. The design is entirely of brick, no stone trimmings being anywhere employed. Sills and water tables are of brick, which should be laid in cement. The mouldings used are extremely simple and few in number; with the exception of the cornices and water tables of buttresses where drip mouldings were required, only a single form of moulding has been used throughout. The tracery is made very simple in design, so that it could be built up with simple moulded brick arches, using special brick only at the springing of the tracery and at the intersections of the tracery bars. The interior is vaulted entirely in brick. The best effect would be obtained by building the walls of common red brick, laid with wide joints in white mortar.

The lower portion up to the plinth should be of hard burned bricks laid in cement. All window mullions and the parts of the supports of the arches which require strength, and the gable and buttress copings should also be laid in cement. The walls might be bonded in Gothic or cross bond, which varies from English bond in laying the stretchers so that they are over each other only in alternate stretcher courses, instead of having the stretchers all over each other as in English bond. The vaults might have the vaulting compartments of a small yellow brick, while the vaulting ribs should be red moulded brick so as to carry up the wall color into the ceiling. In the detail of the transept wall an arrangement of recesses is shown, which adds to the appearance of the wall and carries the line of the nave arcade. Such a system of blank arcading is often useful in giving interest and architectural treatment to a wall where the design requires it.

Plate 39. Building for the Girls' Mutual Benefit Club, Chicago. Jenney, Mundie & Waid, Architects.

This design is built entirely of plain, unmoulded brick, with the single exception of the crown moulding of the cornice, which has a simple moulding of Anderson manufacture. The only feature we are inclined to criticise is the arcaded corbel-table in the cornice, which, it seems to us, might have been improved by using somewhat smaller arches, which would have been more in scale with the rest of the work. But in spite of this defect the cornice is unusually interesting and effective. We referred to this building on the occasion of the publication of a perspective sketch of it in the March number of the *Inland Architect*.

Plate 40. Detail of Building Corner Congress and Purchase Streets, Boston. Cabot, Everett & Mead, Architects.

This plate gives the detail of the upper portion of a simple brick warehouse and store building, and gives a variety of detail, all obtained with plain unmoulded brick. The building is built of Eastern face brick laid in red mortar.

BOOK REVIEW.

Details for Stone and Brick Architecture in Romanesque-Gothic Style: Bases, Profiles, Cornices, Architraves, Windows, Dormers, Oriels, Balconies, Towers, Chimneys, Doors, Gates, Stairs, Vaults, and other details in Stone and Brick, by G. G. Ungewitter. Berlin: Claessen & Co.

The third edition of this German publication, of whose title the above is a translation, has been sent us for notice. It is a portfolio containing lithographic plates of various details, as indicated by the title, drawn in line. The designs are German-Gothic in style, and many of them round arched, whence we presume the curious appellation "Romanesque-Gothic." Many of the plates show interesting and ingenious treatments of brick detail; some of the diaper patterns in brickwork are especially suggestive. In general, the detail of the brickwork is more interesting than the larger designs of which they form a part, and which have the defects which are common in the recent revival in Germany of late German-Gothic forms. Still, as we have said, the work contains much that is suggestive.